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### REMARKS

The June 18, 2002 Office Action was based upon pending Claims 1 and 15-29, wherein Claims 1 and 15-17 are withdrawn from consideration. By this paper, Applicants amend Claims 18-29. Thus, after entry of this Amendment, Claims 1 and 15-29 are pending, with Claims 1 and 15-17 being withdrawn from consideration. Applicants respectfully submit that Claims 18-29 are patentably distinguished over the cited references, and respectfully request the Examiner to pass Claims 18-29 to allowance.

The specific changes to the amended claims are shown on a separate set of pages attached hereto and entitled VERSION WITH MARKINGS TO SHOW CHANGES MADE, which follows the signature page of this Amendment. On this set of pages the insertions are underlined while the ~~deletions are struck through~~.

### Claim Rejections Under 35 U.S.C. §112

#### *Rejections under 35 U.S.C. §112, first paragraph*

In the June 18, 2002 Office Action, the Examiner rejects Claims 18-29 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. More particularly, the Examiner asserts that neither the specification nor the prior art gives any guidance or teaching as to the selection of an intermediate substance, that the meaning of "crystallization temperature" is not clear, that there is no suggestion of how to remove the liquid layer that would enable one of ordinary skill in the art to form a screen consisting of single-crystalline columns of substrates, and that the term "microrelief of inhomogenities" is not defined and unclear.

Applicant has amended Claim 18 to define a method of preparing luminescent screens that includes providing a substrate having columns of a single-crystalline material, wherein the single-crystalline material has a predetermined crystallization temperature, depositing an intermediate material on the substrate, wherein the intermediate material is non-luminescent and is selected to be liquid at the crystallization temperature of the single-crystalline material, and depositing a luminescent material on the substrate, wherein the luminescent material is different

from the intermediate material. Applicant believes that the amendments made to Claim 18 in combination with the following comments overcome the rejection under 35 U.S.C. §112, first paragraph.

As to the intermediate substance, the specification describes that the intermediate material is deposited on a substrate (page 2, 2<sup>nd</sup> paragraph of the Summary of the Invention, lines 2-4). Further, the specification describes that the applied technology is based on chemical or physical vapor deposition, wherein a liquid phase in the deposition process is of particular importance (page 4, lines 20-22). The specification describes also that the intermediate material is formed by more than one chemical element, wherein at least one element operates as a luminescent activator or co-activator (page 2, 3<sup>rd</sup> paragraph of the Summary of the Invention). In addition to that, the specification cites and discusses the content of several patent documents that relate to cathodoluminescent screens.

In view of the disclosure in the specification and the general knowledge of the person skilled in the art of cathodoluminescent screens, Applicants respectfully submit that the specification gives sufficient guidance and teaching as to the selection of an intermediate material selected to be liquid at the crystallization temperature of the single-crystalline material of the substrate, as recited in amended Claim 18. For example, the skilled person would recognize that the intermediate material may be a thin-film (see Claim 19) of a metallic element or a metal alloy. Further, the skilled person would recognize that the intermediate material is either a low-melting point material, such as gallium, indium, tin, lead, or the like, or a material that is liquid (i.e., melted) when it interacts with another material (e.g., phosphor) in accordance with the known phase diagram of the material and, e.g., the phosphor.

Further, the intermediate material is deposited on the substrate before the crystallization (formation) of the single-crystalline columns (e.g., phosphor as a luminescent material). The intermediate material facilitates and ensures the formation of the columns on the substrate. To be effective in the formation of the columns, the material is preferably liquid because the liquid phase (droplets) "attracts" the depositing material (e.g., phosphor) and acts as a catalyst for the deposition. The droplets are formed on the substrate if the melting point of the intermediate material is lower than the crystallization temperature.

In the alternative, the liquid phase can be formed on the substrate even if the melting point of the intermediate material is higher than the crystallization temperature. This is possible if the intermediate material interacts with the substrate or with the depositing material (e.g., phosphor). This interaction forms a liquid phase in accordance with the known phase diagram of the interacting materials. As known to the skilled person, such interaction is known as "contact melting". The latter relates to Claim 20 ("contact interaction"), and to Claim 19 ("thickness...is less than 1 micrometer") because the thin film liquid layer is thermodynamically unstable and breaks out for a plurality of small droplets giving onset to the formation of the phosphor columns.

The specification, therefore, provides clear guidance and teaching to one of ordinary skill in the art to practice the invention with respect to the intermediate material. Applicants respectfully request the Examiner to reconsider the rejection of Claim 18 with respect to the language relating to "intermediate material."

As to the crystallization temperature, amended Claim 18 defines that the single-crystalline material has a predetermined crystallization temperature. In view of the foregoing discussion of "intermediate material," Applicants submit that the skilled person knows that each of the materials used in chemical or physical vapor deposition has a specific melting point so that the material changes its phase when the temperature is reduced from above the melting point to below the melting point. That is, at the crystallization temperature, the material changes from the liquid phase to the solid phase. Therefore, Applicants respectfully request the Examiner to reconsider the rejection of Claim 18 with respect to the crystallization temperature.

As to the removal of the liquid layer, Applicants submit that the skilled person recognizes that no removal of the liquid layer is necessary. This is because the liquid is exhausted during crystallization of the columns.

As to the microrelief of inhomogenities, Applicants have amended Claims 24-26 to avoid the objected term. Amended Claim 24 defines that at least one of a predetermined structure and a predetermined chemical composition is formed on the substrate. Amended Claim 25 defines that a predetermined regular structure is formed on the substrate, and amended Claim 26 defines

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that a predetermined structure is formed on the substrate, wherein the structure has a crystallographically-symmetric character.

In view of the amended claims and the foregoing comments, Applicants respectfully submit that the present application enables one of ordinary skill in the art to make and/or use the invention. Accordingly, Applicants respectfully request the Examiner to withdraw the rejections under 35 U.S.C. §112, first paragraph.

*Rejections under 35 U.S.C. §112, second paragraph*

Further, the Examiner rejects Claims 18-29 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. More particularly, the Examiner asserts that the claims include phrases that are unclear and that some terms lack antecedent basis.

As to Claims 18-29, the Examiner asserts that the phrase "an intermediate substance forming a liquid phase at the crystallization temperature" is unclear. Applicants have amended Claim 18 to define that a substrate has columns of a single-crystalline material having a predetermined crystallization temperature.

The Examiner asserts also that the phrase "luminescent screens consisting of single-crystalline columns on substrates" is unclear and states that "comprising" may be more appropriate than consisting of. Applicants have amended Claim 18 to avoid the allegedly unclear phrase.

Further, the Examiner asserts that the term "crystallization temperature" lacks antecedent basis. Applicants have amended Claim 18 to define that the single-crystalline material has a predetermined crystallization temperature.

As to Claim 23, the Examiner questions whether the intermediate substance itself is luminescent. Applicants have amended Claim 18 to define that the intermediate material is non-luminescent.

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As to Claims 24-26 and 28-29, the Examiner asserts that the term "a microrelief of inhomogeneities" is unclear. Applicants have amended Claims 24-26: Amended Claim 24 defines that at least one of a predetermined structure and a predetermined chemical composition is formed on the substrate. Amended Claim 25 defines that a predetermined regular structure is formed on the substrate, and amended Claim 26 defines that a predetermined structure is formed on the substrate, wherein the structure has a crystallographically-symmetric character.

As to Claim 25, the Examiner questions how inhomogeneities can be "regular." Applicants have amended Claim 25, as set forth above, to avoid the term in question.

As to Claim 27, the Examiner asserts that the term "the activator or co-activator" lacks antecedent basis. Applicants have amended Claim 27 to depend from Claim 23, which recites an activator or co-activator. In this regard, Applicants submit that "activator" and "co-activator" are common phosphor terms. The activator is a doping element that activates a phosphor action. The co-activator is a second doping element in the same phosphor that modifies the phosphor action.

In view of amended Claims 18-29 and the foregoing comments, Applicants respectfully submit that the claims are definite. Accordingly, Applicants respectfully request the Examiner to withdraw the rejection under 35 U.S.C. §112, second paragraph.

#### **Claim Objections**

The Examiner objects to Claims 24-26 because of typographical errors. Applicants have amended the claims to correct these errors. Accordingly, Applicants respectfully request the Examiner to withdraw the objections to Claims 24-26.

#### **CONCLUSION**

Applicants have endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. In light of the above remarks, reconsideration and withdrawal of the outstanding rejections is specifically requested.



VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims have been amended as follows:

18. (Amended) A method ~~for preparation of~~ preparing luminescent screens ~~consisting of single crystalline columns on substrates by vapor deposition of luminescent material, comprising:~~

providing a substrate having columns of a single-crystalline material, the single-crystalline material having a predetermined crystallization temperature;

depositing ~~wherein~~ an intermediate substance material on the substrate, wherein the intermediate material is non-luminescent and is selected to ~~forming a~~ liquid phase at the crystallization temperature of the single-crystalline material, ~~other than the luminescent material, is first deposited on the substrate;~~ and

depositing, then, the a luminescent material is ~~deposited on such a~~ the substrate, wherein the luminescent material is different from the intermediate material.

19. (Amended) The method according to Claim 18, wherein a thickness of the intermediate ~~substance material~~ is more than 10 nanometers and ~~smaller~~ less than 1 micrometer.

20. (Amended) The method according to Claim 18, wherein the intermediate material is liquid phase is ~~formed~~ at a contact interaction of the intermediate ~~substance material~~ with the substrate.

21. (Amended) The method according to Claim 18, wherein the intermediate ~~substance is formed by~~ material includes more than one chemical elements.

22. (Amended) The method according to Claim 19, wherein the intermediate ~~substance is formed by~~ material includes more than one chemical elements.

23. (Amended) The method according to Claim 21, wherein at least one of the chemical elements ~~operating~~ acts as a luminescent activator or co-activator.

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24. (Amended) The method according to Claim 18, ~~wherein a microrelief of inhomogeneities in~~ further comprising forming at least one of a predetermined structure and a predetermined chemical composition is created on the substrate.

25. (Amended) The method according to Claim ~~18~~24, ~~wherein the inhomogeneities further comprising forming a predetermined regular structure on the substrate are of a regular character.~~

26. (Amended) The method according to Claim ~~25~~18, ~~wherein the inhomogeneities further comprising forming a predetermined structure on the substrate, wherein the structure has~~ have a crystallographically-symmetric character.

27. (Amended) The method according to Claim ~~18~~23, wherein the activator or co-activator is introduced into the luminescent material by means of ion implantation.

28. (Amended) The method according to Claim 26, wherein the luminescent material is coated by a thin layer of a material transparent for ~~passing through it of~~ electrons.

29. (Amended) The method according to Claim 28, wherein the transparent material includes a diamond or diamond-like material ~~serve as the transparent material~~.